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Aerospace Engineers develop new technologies for use in aviation, defense systems, and space exploration, often specializing in areas such as structural design, guidance, navigation and control, instrumentation and communication, or production methods. They often use Computer-Aided Design (CAD) software, robotics, and lasers and advanced electronic optics to assist them. They also may specialize in a particular type of aerospace product, such as commercial transports, military fighter jets, helicopters, spacecraft, or missiles and rockets. Aerospace Engineers may be experts in aerodynamics, thermodynamics, celestial mechanics, propulsion, acoustics, or guidance and control systems.

Aerospace Engineers typically are employed within the aerospace industry, although their skills are becoming increasingly valuable in other fields. For example, Aerospace Engineers in the motor vehicles manufacturing industry design vehicles that have lower air resistance, increasing fuel efficiency in vehicles.

Tasks

- ▶ Formulate conceptual design of aeronautical or aerospace products or systems to meet customer requirements.
- ▶ Direct and coordinate activities of engineering or technical personnel designing, fabricating, modifying, or testing of aircraft or aerospace products.
- ▶ Develop design criteria for aeronautical or aerospace products or systems, including testing methods, production costs, quality standards, and completion dates.
- ▶ Plan and conduct experimental, environmental, operational and stress tests on models and prototypes of aircraft and aerospace systems and equipment.
- ▶ Evaluate product data and design from inspections and reports for conformance to engineering principles, customer requirements, and quality standards.
- ▶ Formulate mathematical models or other methods of computer analysis to develop, evaluate, or modify design according to customer engineering requirements.
- ▶ Write technical reports and other documentation, such as handbooks and bulletins, for use by engineering staff, management, and customers.

Aerospace Engineers

- Analyze project requests and proposals and engineering data to determine feasibility, productibility, cost, and production time of aerospace or aeronautical product.

Detailed descriptions of this occupation may be found in the Occupational Information Network (O*NET) at online.onetcenter.org.

Important Skills, Knowledge, and Abilities

- Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions, or approaches to problems.
- Judgment and Decision Making — Considering the relative costs and benefits of potential actions to choose the most appropriate one.
- Time Management — Managing one's own time and the time of others.
- Active Learning — Understanding the implications of new information for both current and future problem-solving and decision-making.
- Writing — Communicating effectively in writing as appropriate for the needs of the audience.
- Reading Comprehension — Understanding written sentences and paragraphs in work-related documents.
- Monitoring — Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.
- Engineering and Technology — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.
- Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.
- Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.
- Physics — Knowledge and prediction of physical principles, laws, their interrelationships, and applications to understanding fluid, material, and atmospheric dynamics, and mechanical, electrical, atomic and subatomic structures and processes.
- Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.
- Mathematical Reasoning — The ability to choose the right mathematical methods or formulas to solve a problem.
- Near Vision — The ability to see details at close range (within a few feet of the observer).

Work Environment

Aerospace Engineers generally work in well-equipped offices in engineering departments or research laboratories. Most engineers spend the majority of their time in modern, clean, temperature-controlled buildings. They often work on computer terminals, drafting tables, or with research and test equipment in a laboratory.

Aerospace Engineers may work at industrial plants, manufacturing operations, aviation facilities and aerospace launch pads. They usually supervise, direct, or inspect ongoing production or construction operations. Some engineers are required to travel. Engineers who work at aviation and flight test sites will often fly the test aircraft. This can be dangerous work.

Most Aerospace Engineers work day shifts on a standard 40-hour workweek. They may occasionally work irregular or long hours to meet a deadline or when working on a special project.

What's the California Job Outlook?

The California Outlook and Wage table below represents the occupation across all industries.

Standard Occupational Classification	Estimated Number of Workers 2004	Estimated Number of Workers 2014	Average Annual Openings	2006 Wage Range (per hour)
Aerospace Engineers				
17-2011	24,400	25,600	730	\$36.91 to \$54.10

Wages do not reflect self-employment.

Average annual openings include new jobs plus net replacements.

Source: www.labormarketinfo.edd.ca.gov, Employment Projections by Occupation and OES Employment & Wages by Occupation, Labor Market Information Division, Employment Development Department.

Trends

Despite the expected slower-than-average growth in employment of Aerospace Engineers, favorable opportunities are expected through 2014 for two reasons. First, the number of degrees granted in aerospace engineering has declined greatly over the last decade due to the perceived lack of opportunities in this occupation. Second, the decline in degree production has reached the point that the number trained in aerospace engineering may not be adequate to replace the large numbers of Aerospace Engineers who are expected to leave the occupation, especially due to retirement, over the 2004-2014 period.

Training/Requirements/Apprenticeships

California offers bachelor and postgraduate degrees in aeronautical engineering at many universities and colleges. College students should enroll in a program approved by the Accreditation Board for Engineering and Technology (ABET). This accreditation is highly regarded and confirms the quality of education that students receive in this professional program. The completion of an accredited program is extremely important for any student who will be continuing on to graduate school. Often graduate study is limited to only those students that complete their undergraduate work at a college with an accredited program.

To be effective, Aerospace Engineers must continue to learn and study throughout their careers in order to keep up with the constant advancements being made in the field. This is especially true with computer applications, which are evolving and advancing constantly.

Aerospace Engineers typically are employed in the aerospace product and parts industry, although their skills are becoming increasingly valuable in other fields. For example, in the motor vehicle manufacturing industry, Aerospace Engineers design vehicles that have lower air resistance and, thus, increased fuel efficiency.

Recommended High School Course Work

Colleges and universities are usually specific in their entrance requirements. High school required courses usually include algebra, geometry, trigonometry, calculus, physics, chemistry, and English.

Aerospace Engineers

Manufacturing Careers

Where Do I Find the Job?

Most colleges and universities have a placement center on campus to help graduates with their job search. Large aerospace and aircraft companies will often send recruiters to college campuses to interview seniors about to graduate. Students who have been working part-time as an intern at a company might immediately get hired upon graduation.

Direct application to employers remains one of the most effective job search methods.

Use the *Search for Employers by Industry* feature on the *Career Center* page at www.labormarketinfo.edd.ca.gov to locate employers in your area. Search using keywords from the following manufacturing industry names to get a list of private firms and their addresses:

- ▶ Aircraft
- ▶ Electric Power & Specialty Transformers
- ▶ Guided Missile
- ▶ Motor and Generator
- ▶ Physical/Engineering/Biological Research
- ▶ Relay & Industrial Control
- ▶ Social Science/Humanities Research
- ▶ Space
- ▶ Switchgear and Switchboard Apparatus

Search these **yellow page** headings for listings of private firms:

- ▶ Aircraft Parts
- ▶ Airlines
- ▶ Department of Defense (Govt. Pages)
- ▶ Engineers-Communications
- ▶ Engineers-Consulting
- ▶ Engineers-Industrial
- ▶ Engineers-Manufacturing
- ▶ Engineers-Power
- ▶ Federal Aviation Admin. (Govt. Pages)

Where Can the Job Lead?

Advancement opportunities are usually in the form of Senior or Supervising Aerospace Engineer, or to managerial positions in charge of large divisions within large organizations.

Lateral career moves are common, since those with engineering degrees can easily move into mechanical engineering jobs.

Other Sources of Information

American Institute of Aeronautics and Astronautics
www.aiaa.org

American Astronomical Society
www.aas.org

National Aeronautics and Space Administration (NASA)
www.nasa.gov